

WHAT IS CLAIMED IS:

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1. Magnetic powder composed of an alloy composition represented by  $R_x(Fe_{1-y}Co_y)_{100-x-z-w}B_zNb_w$  (where R is at least one kind of rare-earth element, x is 7.1 - 9.9at%, y is 0 - 0.30, z is 4.6 - 6.9at%, and w is 0.2 - 3.5at%), the magnetic powder being constituted from a composite structure having a soft magnetic phase and a hard magnetic phase, wherein the magnetic powder has magnetic properties in which, when the magnetic powder is formed into an isotropic bonded magnet having a density  $\rho$  [Mg/m<sup>3</sup>] by mixing with a binding resin and then molding it, the maximum magnetic energy product  $(BH)_{max}$  [kJ/m<sup>3</sup>] of the bonded magnet at the room temperature satisfies the relationship represented by the formula  $(BH)_{max}/\rho^2 [\times 10^{-9} J \cdot m^3 / g^2] \geq 2.2$ , and the intrinsic coercive force  $(H_{CJ})$  of the bonded magnet at the room temperature is in the range of 320 - 720 kA/m.

2. The magnetic powder as claimed in claim 1, wherein when the magnetic powder is formed into an isotropic bonded magnet having a density  $\rho$  [Mg/m<sup>3</sup>] by mixing with a binding resin and then molding it, the remanent magnetic flux density  $Br$  [T] at the room temperature satisfies the relationship represented by the formula of  $Br/\rho [\times 10^{-6} T \cdot m^3 / g] \geq 0.125$ .

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3. Magnetic powder composed of an alloy composition represented by  $R_x(Fe_{1-y}Co_y)_{100-x-z-w}B_zNb_w$  (where R is at least one kind of rare-earth element, x is 7.1 - 9.9at%, y is 0 - 0.30, z is 4.6 - 6.9at%, and w is 0.2 - 3.5at%), the magnetic powder being constituted from a composite structure having a soft magnetic phase and a hard magnetic phase, wherein the magnetic powder has magnetic properties in which, when the magnetic powder is formed into an isotropic bonded magnet having a density  $\rho$  [Mg/m<sup>3</sup>] by mixing with a binding resin and then molding it, the remanent magnetic flux density  $Br$  [T] at the room temperature satisfies the relationship represented by the formula of  $Br/\rho [\times 10^{-6} T \cdot m^3 / g] \geq 0.125$ .

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4. The magnetic powder as claimed in claim 3, wherein when the magnetic powder is formed into an isotropic bonded magnet by mixing with a binding resin and then molding it, the intrinsic coercive force ( $H_{CJ}$ ) of the magnet at the room temperature is in the range of 320 - 720 kA/m.

5. The magnetic powder as claimed in any one of claims 1 to 4, wherein when the magnetic powder is formed into an isotropic bonded magnet by mixing with a binding resin and then molding it, the absolute value of the irreversible flux loss (initial flux loss) is equal to or less than 6.2%.

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6. The magnetic powder as claimed in any one of claims 1 to 4, wherein said R comprises rare-earth elements mainly containing Nd and/or Pr.

7. The magnetic powder as claimed in any one of claims 1 to 4, wherein said R includes Pr and its ratio with respect to the total mass of said R is 5 - 75%.

8. The magnetic powder as claimed in any one of claims 1 to 4, wherein said R includes Dy and its ratio with respect to the total mass of said R is equal to or less than 14%.

9. The magnetic powder as claimed in any one of claims 1 to 4, wherein the magnetic powder is obtained by quenching the alloy of a molten state.

10. The magnetic powder as claimed in any one of claims 1 to 4, wherein the magnetic powder is obtained by milling a melt spun ribbon of the alloy which is manufactured by using a cooling roll.

11. The magnetic powder as claimed in any one of claims 1 to 4, wherein the magnetic powder is subjected to a heat treatment for at least once during the manufacturing process or after its manufacture.

Sub B1 A 12. The magnetic powder as claimed in any one of claims 1 to 11, wherein the average particle size of the magnetic powder lies in the range of 0.5 - 150 $\mu$ m.

13. An isotropic bonded magnet formed by binding a magnetic powder containing Nb with a binding resin, wherein the isotropic bonded magnet is characterized in that, when the density of the isotropic bonded magnet is  $\rho$  [Mg/m<sup>3</sup>], the maximum magnetic energy product  $(BH)_{\max}$  [kJ/m<sup>3</sup>] at the room temperature satisfies the relationship represented by the formula  $(BH)_{\max}/\rho^2 [\times 10^{-9} \text{J}\cdot\text{m}^3/\text{g}^2] \geq 2.2$ , and the intrinsic coercive force ( $H_{CJ}$ ) of the bonded magnet at the room temperature is in the range of 320 - 720 kA/m.

14. The isotropic bonded magnet as claimed in claim 13, wherein when the density of the isotropic bonded magnet is  $\rho$  [Mg/m<sup>3</sup>], the remanent magnetic flux density  $B_r$  [T] at the room temperature satisfies the relationship represented by the formula of  $B_r/\rho [\times 10^{-6} \text{T}\cdot\text{m}^3/\text{g}] \geq 0.125$ .

15. An isotropic bonded magnet formed by binding a magnetic powder containing Nb with a binding resin, wherein the isotropic bonded magnet is characterized in that, when the density of the isotropic bonded magnet is  $\rho$  [Mg/m<sup>3</sup>], the remanent magnetic flux density  $B_r$  [T] at the room temperature satisfies the relationship represented by the formula of  $B_r/\rho [\times 10^{-6} \text{T}\cdot\text{m}^3/\text{g}] \geq 0.125$ .

16. The isotropic bonded magnet as claimed in claim 15, wherein the intrinsic coercive force ( $H_{CJ}$ ) of the bonded magnet at the room temperature is in the range of 320 - 720 kA/m.

Sub B2 17. The isotropic bonded magnet as claimed in any one of claims 13 to 16, wherein said magnetic powder is formed of R-TM-B-Nb based alloy (where R is at least one rare-earth element and TM is a transition metal containing Iron as a major component thereof).

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A 18. The isotropic bonded magnet as claimed in any one of claims 13 to ~~14~~<sup>16</sup>, wherein the magnetic powder is composed of an alloy composition represented by  $R_x(Fe_{1-y}Co_y)_{100-x-z-w}B_zNb_w$  (where R is at least one kind of rare-earth element, x is 7.1 - 9.9at%, y is 0 - 0.30, z is 4.6 - 6.9at%, and w is 0.2 - 3.5at%).

A 19. The isotropic bonded magnet as claimed ~~claim 17 or 18~~<sup>in claim 17</sup>, wherein said R comprises rare-earth elements mainly containing Nd and/or Pr.

A 20. The isotropic bonded magnet as claimed in ~~any one of claims 17 to 19~~<sup>claim 17</sup>, wherein said R includes Pr and its ratio with respect to the total mass of said R is 5 - 75%.

21. The isotropic bonded magnet as claimed in ~~any one of claims 17 to 20~~<sup>claim 17</sup>, wherein said R includes Dy and its ratio with respect to the total mass of said R is equal to or less than 14%.

22. The isotropic bonded magnet as claimed in any one of claims 13 to ~~21~~<sup>16</sup>, wherein the average particle size of the magnetic powder lies in the range of 0.5 - 150 $\mu$ m.

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A 23. The isotropic bonded magnet as claimed in any one of claims 13 to ~~22~~<sup>16</sup>, wherein the absolute value of the irreversible flux loss (initial flux loss) is equal to or less than 6.2%.

A 24. The isotropic bonded magnet as claimed in any one of claims 13 to ~~23~~<sup>16</sup>, wherein the magnetic powder is constituted from a composite structure having a soft magnetic phase and a hard magnetic phase.

A 25. The isotropic bonded magnet as claimed in any one of claims 13 to ~~24~~<sup>16</sup>, wherein the isotropic bonded magnet is to be subjected to multipolar magnetization or has already been subjected to multipolar magnetization.

26. The isotropic bonded magnet as claimed in any one of claims

*See*  
*16*  
*A* 13 to ~~25~~, wherein the isotropic bonded magnet is used for a motor.